CENTER FOR INSTITUTIONAL REFORM AND THE INFORMAL SECTOR

University of Maryland at College Park

Center Office: IRIS Center, 2105 Morrill Hall, College Park, MD 20742
Telephone (301) 405-3110 • Fax (301) 405-3020

BRAZILIAN TAX COLLECTION REFORM AND ITS EFFECTS

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Charles M. Kahn and Emilson C.D. Silva

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Authors: Charles M. Kahn (University of Illinois at Urbana-Champaign) and Emilson C.D. Silva (University of Oregon)

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This study uses data from the Brazilian tax collection authority (Secretaria da Receita Federal) to examine the effects and effectiveness of a major reform instituted in 1989 to provide incentives for improvement in the enforcement of tax laws: by inspectors. The reform provides monetary compensation to the collectors based on their individual and group performance in finding and collecting taxes from tax evaders. The size of the rewards is quite significant: incentive bonuses frequently constitute more than half of the pay of individuals in the collection agency.

We find evidence that instituting the plan did influence incentives both at the group and at the individual level. Overall, productivity in collecting delinquent taxes declined over the period; however, the decline was least in low-value added areas and sectors and greatest in high value-added areas and sectors. The overall decline is probably partly illusory -- extreme inflation rates at the beginning of our period probably distort the data and partly due to a secular shift in the difficulty of finding evaders. The relative movements in productivity apparently stem from two sources: a shift of resources within the collection authority away from lower productivity activities towards higher productivity activities, and a stronger incentive effect from the reform on low value-added activities and sectors.

We reach the following conclusions:

i. Although the total value of the bonuses paid was large, the incentive effect of the bonuses was significantly blunted by three factors.

First, a large part of the payment during the period studied is linked to- group rather than individual performance, dampening individual incentives, particularly in large agencies. Second, since the individual evaluation procedure contains subjective estimates of individual performance by supervisors, the procedure may encourage individuals to reduce their effort toward group norms. Finally, the ceiling imposed on total payments will render marginal returns near zero for agents in the higher opportunity areas.

2. A plan with a low ceiling like the Brazilian plan provides significant incentives primarily for agents in initially low-productivity activities; and little or no incentive for agents working in high-productivity activities.

3. Even though group performance-based incentive payments do blunt individual effort, they can have positive effects on overall productivity. In particular group performance rewards give incentives to the group to allocate its manpower in more effective ways. We have

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*Department of Economics, University of Illinois, Urbana-Champaign, and Department of Economics, University of Oregon, respectively. We thank Murilo Rodrigues, João Caputo e Oliveira, Andre Oliveira, and Anderson C.D. Silva for their help in obtaining the data for this study.

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Effective collection of tax revenues is a prerequisite for a sound economy. A nations plans for economic development will founder if the government lacks the means to collect the funds mandated by that plan. Many developing countries have been plagued by the inability to collect tax revenues. In countries without effective tax collection authorities, the form which taxes take may be severely limited. A limited base for taxation in turn can lead to severe distortions in an economy: the limited base necessitates high rates of taxation, further diverting economic activity toward the sectors in which tax collection is ineffective.

It is therefore not surprising that many countries make reform of their collection systems a priority in economic development programs. The theory of incentives and mechanism design has much to say about the theoretical effects likely from reform of tax collection agencies. But the practical evaluation of such programs requires a close examination of the data on tax collection and enforcement.

This study uses data from the Brazilian tax collection authority (Secretaria da Receita Federal) to examine the effects and effectiveness of a major reform instituted in 1989 to provide incentives for improvement in the enforcement of tax laws by inspectors. The reform effectively provides monetary compensation to the collectors based on their individual and group performance in finding and collecting taxes from tax evaders. The size of the rewards are quite significant; incentive bonuses frequently constitute more

than half of the pay of individuals in the collection agency.

The data from the agency start with the year immediately before the reforms were instituted and cover several years after the reforms were in place. They therefore allow us to examine the effectiveness of the incentive program. The data are subdivided by region of collection, by type of tax collected and by specific programs for collection. They provide information on numbers of personnel involved in the collection and on the success rates of various programs for collection. This cross-sectional information allows us to examine the incentive effects in the program.

The paper is divided as follows: Section I provides a conceptual framework and simple model of incentives for tax collectors. Section II provides an overview of the Brazialian tax system and describes the reform instituted by the authorities. Section III describes the data collected and the evidence it provides.

Our fundamental finding is that while productivity in collecting delinquent taxes declined over the period, the decline has been least in low-value added areas and sectors and greatest in high value-added areas and sectors. The overall decline is probably partly illusory -- extreme inflation rates at the beginning of our period probably distort the data -- and partly due to a secular shift in the difficulty of finding **evaders.The** relative movements in productivity apparently stem from two sources: a shift of resources within the collection authority away from the lower productivity activities towards the higher productivity activities, and a heavier incentive effect from the reform on low value-added activities and sectors.

I. FRAMEWORK

Conceptually we can divide the temptations affecting a tax collection officer into two categories: "shirking" and "corruption." Shirking is the basic moral hazard problem: Finding evaders is difficult work; a collector will, ceteris paribus, prefer to skimp on the necessary effort. Solutions to the problem ultimately must take the form of output-based incentives. These may be explicit -- bounties for each evader found or for each extra dollar of taxes collected -- or implicit -- for example informal quotas of miscreants found, as a condition for retention or promotion by the agency. In actual systems, incentives can become extremely complex: they can be tailored to the experience of the agent, to the location or type of tax that the agent works with. Nonetheless, no matter what the detail of the arrangement, the fundamental tradeoff is the same: If the individual's marginal return is too small, the incentive is ineffective; if it is too large the scheme may eventually encourage the use of improper methods of collection (e.g., framing victims in order to collect).

The tax collection authority faces a second incentive problem beyond the problem of generating sufficient effort on the part of its employees: assuring that that information is passed on to the collection authority. Once the collector has made the determination that evasion has occurred, he may decide to use the information to his own advantage, by extracting a bribe from the evader. Anti-corruption programs designed to discourage bribery take many forms, including inspection of the work of collectors, rewards to individuals who report corrupt officials, and heavy fines. When corruption has become endemic, the only effective remedy may be a "housecleaning" with mass firings

of individuals with a history of corruption.

Sometimes it Is argued that the payment of incentives for collections will also reduce corruption. The model we provide below argues that this is unlikely: If, as is plausible, there is a fixed cost to bribe-taking (penalties for being caught have a fixed component, unrelated to the size of the bribe in question) then there is a cutoff size of evasion below which bribes will not be taken in the first place. But the incentive payments must exceed the value of the corruption in order to be effective as an anti-corruption tool.

A Very Simple Model of Effort and Corruption Incentives

For simplicity, we assume all agents are risk neutral. Each inspector is assigned to investigate a particular set of taxpayers. Let e be the cost to the inspector (effort) of a conscientious investigation. Let p be the ex ante probability that the inspector detects evasion in a conscientious inspection (the probability is zero if effort is not expended), Let B be expected bounty to be received for turning in an evader; let T be the expected amount of taxes recoverable from the agent if he is an evader (including any penalties); let C be the expected cost of acting corruptly (assumed to be borne entirely by the inspector). The inspector is assumed to know the value of these parameters for any case he is assigned.

Once an evader is found then $(T - C)$ is the benefit jointly shared by evader and inspector from not reporting the evasion; B is the benefit to the inspector from reporting the evasion, Efficient bargaining implies that the evader will be reported if

$$B > T - C \qquad (1)$$

and not if the inequality is reversed. The inspector will have to be bribed by the evader not to report; the inspector will receive a bribe of

$$aT + (1 - a)(B + C)$$

where a, representing the inspector's bargaining power, is a parameter assumed fixed between 0 and 1, with higher values representing greater bargaining power to the inspector. Note that we assume that the effort lies in the initial detection, so that it is a sunk cost at the point of any bargaining with the evader.

Thus the expected value to the inspector from embarking on an inspection is

$$p \max \{B, \; a(T-C) + (1 - a)B\} - e$$

Inspection occurs if this number is positive; shirking occurs if it is negative. Thus the inspector will inspect and report the results only if (1) holds and

$$p\,B > e \qquad (2)$$

The decision-making process described above applies to each project that the inspector is assigned. Projects differ in their prospects; in particular, each has its own expected return T; we denote the distribution of returns by $F(T)$. The amount of the bounty, in general is a function of the amount of tax collected; therefore we write $B(T)$ and assume that the function B which describes the incentive policy is a non-decreasing function, with $B' < 1$.

However, the costs of acting corruptly are, for the most part, invariant with respect to the size of the evasion, and we therefore make the assumption that C is constant per inspection.

Given the incentive policy, and holding the probability of detection fixed, there are two critical values of tax recovery $T1$ and T2 such that if T is less than $T1$, the inspector puts in no effort on the case and if T exceeds $T2$, the inspector succumbs to corruption. These values are defined by the following conditions: [1]

$$pB(T1) = e$$

$$T2 \cdot B(T2) = C$$

An inspector who is subject to these incentives will make

$$F(T2) \cdot F(T1)$$

(recorded) inspections, collecting a total of

$$p\int_{T1}^{T2} T \, dF(T)$$

in unpaid taxes and fines.

To understand the implications of this model, first consider the consequences of a tax reform which reduces evasion. There are two possible effects. First a reform could reduce the frequency of tax evasion -- in this case, p is reduced. As a result, collection will be more difficult, and the

[1] We will mnintnin parametric restrict-inns which imply $T2 > T1$, for the linear case described below, the sufficient condition is immediate from equations (3) and (4).

inspector is less likely to expend effort ($T1$ rises.) Such a change will, however, have no effect on the frequency of corruption.[2] Second, the reform might reduce the size of the average outstanding liability (for example, a reduction of the tax rate would have this effect; on the other hand improved indexation of penalties would increase the size of penalties outstanding) Such a change would shift the distribution F to the left, reducing the extent of corruption. On the assumption that the distribution of T is such that

$$dF(T1)/dT \quad > \quad dF(T2)/dT$$

(that is, assuming the distribution of evasion in the population is such that small scale evasion is more common than large scale evasion), then the net effect of the tax reform will also be a decrease in dilligence on the part of the inspectors and a decrease in collection of evaded taxes.

In order to consider the effects of alteration in the incentive program we must begin by assuming a particular form for the program, The following form approximates the essential features of the Brazilian program: an inspector who collects T in delinquent taxes receives a fixed proportion bT up to some maximum level B^*. With such a program, the behavior of the agent depends on whether his activities bring him up against the constraint.

First, suppose the constraint is not binding. Then

$$T1 = e/(pb) \tag{3}$$

$$T2 = C/(1 - b) \tag{4}$$

[2] Results from an increase in the cost of effort will be identical.

Increases in the bounty increase collections by increasing $T2$ and decreasing $T1$. The relative magnitudes of these two effects depend on the relative size of $T1$ and $T2$ and on the size of b:

$$dT1/db = - T1/b$$

$$dT2/db = T2/(1-b)$$

Again, it is likely that the increase in number of individuals apprehended will overwhelmingly come from increases at the lower margin. In terms of revenue collected, increases could be equally important at each end, provided that: constraint B^* is not binding. If It Is binding, then on the margin, turning in an evader leads to no increase in the total bounty, and so

$$T2 = C$$

just as it would in the absence of all bounties. In other words, for an inspector for whom the total bounty constraint is binding, changes in the terms of the bounty (either the rate or the ceiling) have no effect at all on corruption.[3] If the ceiling is binding, then increasing the ceiling does increase the total effort, by encouraging the inspector to take on less and less lucrative projects. If the ceiling is binding, then increasing the rate lowers effort, since it takes fewer successful projects to reach the ceiling.

[3] This ignores one other possibility: since the total increases the overall value of retention of the job it increases the penalty associated with being fired for corruption.

(When the ceiling on bounties is not binding, increasing the bounty rate also causes a reduction in corruption Indirectly, through its effect on the incentives of evaders to offer bribes. As the bounty increases, the bribe that will be needed to corrupt an inspector also rises, making it less profitable for tax payers to attempt evasion. This indirect effect will be ignored in the subsequent analysis, but it is important to realize that this deterrence effect could be valuable even in situations where there is no observable increase in collections of evaded taxes.)

To summarize: Consider an economy which moves from a situation of no incentives (that is, b close to zero) to a situation of higher incentives. For all inspectors, there should be an increase in dilligence in collection at the lower margin. For inspectors who receive payment at the new ceiling, there should be little effect on corruption; for inspectors not at the ceiling, there should be decrease in corruption.

Finally, we consider cross-sectional comparisions of the effects of introducing an incentive structure. Assuming that inspectors differ systemmatically in the cost of effort (across regions of the country or across types of assignments) what are the relative effects of the incentive plan on low-cost and high-cost inspectors? Suppose after the plan is introduced, the low-cost inspector finds the constraint on total bonus binding, and the high-cost inspector does not (other cases work analogously). Initially T2 is the same for each (it is not affected by the size of e.) $T2$ increases for the high-cost inspector; it decreases slightly for the low-cost inspector. For both high and low cost inspectors $T1$ decreases proprotionately to the change in b. With only minimal restrictions on the distribution $F(.)$, the implication is that the increase in the number of successful inspections is proportionately greater for the high cost inspector (who will be the inspector

who makes fewer successful inspections initially.) Slightly stronger assumptions on the distribution yield the implication that the increase in revenues collected is proportionately greater as well. [4]

II. AN OVERVIEW OF TAX COLLECTION AND REFORM IN BRAZIL

In Brazil, individuals and corporations are taxed by federal, state and municipal governments. Federal taxes are administered by the Secretaria da Receita Federal (Brazil's equivalent of the U.S. Internal Revenue Service). State and municipal taxes are administered by the local counterparts of the Secretaria da Receita Federal; social security and medicare taxes are administered by the Instituto Nacional de Seguro Social (National Institute of Social Security).

Federal Taxes in Brazil

There are three categories of income taxation: personal income, corporate income, and withholding tax. Personal income from capital or labor sources are taxed; income taxes accrue to the gains each month (because of inflation); tax returns, containing the yearly income, are due in the first quarter of the following year. Corporations are taxed on monthly adjusted profits. Shares of wages, salaries, commissions, fees and interest paid by private and public firms are generally withheld and remitted directly to Receita Federal. There

[4] Again, results are identical if the systematic difference is in the rate of success of inspections. Results are similar if the difference between inspectors is in the distribution of high versus low value projects among which they can choose.

are a variety of social security taxes imposed on corporate income, corporate sales and payrolls. In addition, the federal government imposes value-added taxes at various rates on industrial goods when they leave the production site (IPI, the industrial products tax) or at the time they enter the country (import tax), and taxes on financial operations.

The recent Constitution, enacted in 1988, determines that the following federal tax revenues must be transferred to states and municipalities: (i) 47% of the federal income tax; (ii) 57% of the federal value-added tax; and (iii) 50% of the land property tax. The Constitution also requires some state tax revenues to be transferred to municipalities as follows: (i) 25% of the state value-added tax; and (ii) 50% of the vehicle ownership tax.

Further details of taxation in Brazil are described in the appendix.

The Bonus Program for Tax Collection

On December 33, 1988, the Brazilian government created a bonus program to compensate tax officials for their efforts in collecting taxes and uncovering tax violations. The bonus or reward paid to tax officials is called RAV (Retribuição Adicional Variável). The program came into effect in August 1989.

The program pays bonuses on a monthly basis with revenues raised by the collection of fines imposed for noncompliance with tax provisions. The program's monthly revenues are equal to the difference between the total amount of fines collected during the month, properly adjusted for inflation, and the part of this total which is transferred to states and local governments. The program's monthly revenues are deposited in a fund called FUNDAF (Fundo Especial de Desenvolvimento e Aperfeicoamento das Atividades de Fiscalização). FUNDAF monthly revenues have been, on average, equal to 68% of

the total amount of fines collected.[5]

The RAV (or total bonus) paid to an official is composed of two types of rewards: an individual reward and a group reward. Both types of rewards increase with the amount of fines collected, so both the individual and the group have incentives to increase their productivities. Group rewards are paid with 30% of FUNDAF monthly revenues; individual rewards are paid with the remaining 70%.

The group reward equally compensates all officials within a given tax agency. The group reward is calculated according to the relative efficiency of the agency vis-à-vis other agencies in the country.[6] Three basic factors are used to measure an agency's efficiency: (i) amount of fines collected; (ii) relative performance in reaching pre-established goals (total amount of taxes collected, number of inspections or examinations undertaken, and collection of overdue taxes and fines); and (iii) size of the agency (in terms of the number of officials). The group reward is directly related to items (i) and (ii) and inversely related to item (iii). The first two items are used to determine the agency's total due compensation. An official's group reward is then obtained by dividing the agency's total compensation by the number of officials in the agency.

The individual reward compensates the official for his or her productivity.[7] The individual reward is based on the tax agency's

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[5] In 1989, the Receita Federal started to collect the contributions and fines related to PIS/PASEP (two of the social insurance taxes). The revenues originating with these taxes are directed to the Workers' Fund; they do not generate resources for the RAV program.

[6] There are 110 tax agencies in the country: one central agency, ten regional agencies and 99 local agencies.

[7] Until December, 1992, the individual reward was determined independently of

supervisor's evaluation of the individual's performance. Although there is a established and well-known set of objective criteria to be used in performance evaluations, the supervisor is given discretion to use subjective criteria as well. The official is evaluated every month; the supervisor writes a report (Boletim de Trabalho) in which the individual's performance is graded on a scale from 0 to 70 points. If the official's performance grade is less than or equal to 21 points, the official cannot receive the RAV (neither the individual reward nor the group reward). Officials whose performance points are greater than 21 have their reports sent to the central agency, where performance points are summed up. The "value of the point" is then determined by dividing the total amount allocated to pay individual rewards (i.e., 70% of FUNDAF monthly revenues) by the total number of points. An official's individual reward corresponds to the value of the point times the number of points the official received in the evaluation.

The individual official receives a base salary as well as the total bonus. However, the total compensation received by the official is limited. According to the 1988 Brazilian Constitution, public servants cannot receive a wage higher than the one received by a government minister. Thus, a minister's wage corresponds to a wage ceiling for the tax official.[8]

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the tax agency in which the individual worked; however, starting in January 1993, as a result of changes introduced in October 1992 (CRAV Resolution number 6/92), the individual reward now depends in great part on the performance of the agency in which the official works.

[8]On July 21, 1992, the Parliamentary Inquiry Commission on Tax Evasion interviewed Mr. Nelson Pessuto, the president of the UNAFISCO (Tax Officials National Union). In the hearing, Mr. Pessuto, a senior tax auditor, disclosed information about his earnings. His basic salary was Cr$1.9 million per month and his reward was about Cr$5.9 million per month; it was mentioned in the hearings that rewards to officials varied from Cr$4 million to Cr$ 8 million. (At this time, a minister's salary was about Cr$9 million; the exchange rate was on the order of Cr$ 2300 per dollar.)

(Since October 1992, however, the maximum total bonus tax officials can receive has been restricted even further.[9] According to the recent law, a tax official's total bonus cannot exceed the highest wage paid to a typical-career public servant -- e.g., an admiral. Since the sum of a tax official's basic salary and the highest wage paid to an admiral usually falls short of a minister's wage, the measure has further reduced the wage ceiling facing tax officials.[10])

Whenever the official's due compensation exceeds this ceiling, the excess is taken away from the official and deposited in his or her name in a mutual fund, denoted "Contingent Reserves," which is shared by all tax officials. The official can have access to this wage surplus if he or she does not reach the ceiling in one of the following six months. If, however, the official reaches the wage ceiling in every one of the following six months, he or she loses the excess wage which has been deposited in the Contingent Reserves fund to the collective. Revenues of the Contingent Reserves fund are saved and used as insurance against "hard" times as well as to finance the collective's joint activities.

There are two types of tax officials in the Secretaria da Receita Federal: auditors (AFTNs) and administrative bureaucrats (TTNs). Auditors are

[9] The change instituted in October 1992 (Law number 8447, October 29, 1992) was actually the result of effort exerted by the Secretaria da Receita Federal to replace a previous law (Delegated Law number 13 of August 27, 1992) which had been even more restrictive in limiting the bonus tax officials could receive. The October law was made retroactive to September 1, 1992, effectively nullifying the earlier law.

[10] Field interviews were conducted by one of the authors in January 1993. The consensus of participants and supervisors was that a majority of tax officials in the country received bonuses which placed them at the wage ceiling. Not surprisingly, the most common complaint heard was that the maximum allowable total bonus was too low.

highly skilled; their duties include field or external investigations, examinations of tax returns, customs' inspections, collection of overdue taxes and fines, and supervision of tax agencies. Administrative bureaucrats usually play a more passive role in the investigation and collection procedures. Because of the discrepancies in skills and duties, the rules governing the bonus program establish that the reward paid to a low-level bureaucrat cannot exceed 30% or that paid to an auditor.

In sum, the RAV program provides incentives which affect behavior at two levels -- the individual inspector and the agency. At the agency level, the group bonuses give managers a clear incentive to reallocate their staffs in ways which will increase group performance along dimensions specified by the group criteria--in particular, amount of taxes collected and number of inspections undertaken.

From the point of view of the individual inspector, while the total amounts involved in the bonus program are quite large, the marginal payment per additional unit of revenue collected is more modest. There are three major sources of slippage: First, a large part of the payment during the period studied is linked to group, rather than individual performance, dampening the individual incentives, particularly in large agencies. Second since the individual evaluation procedure contains subjective estimates of individual performance by supervisors, the procedure may encourage individuals to reduce their effort toward group norms. Finally, the ceiling imposed on total payments will render marginal returns near zero for agents in the higher opportunity areas.

Other Programs

The RAV system was one of a number of measures taken during this period

to increase compliance and collection of taxes in Brazil. Inflation rates over 1,000% have motivated a number of actions by the federal government to avoid corrosion of tax revenue. For example, tax liabilities have been fully indexed as of 1992. During the period we examine, individual marginal income tax rates were reduced from 45% to 25%. Nonfinancial corporations also faced reduced marginal rates from 45% in 1987 to 35%; in 1989 the basic corporate income tax rate was reduced from 35% to 30%. Other changes have also been instituted to encourage compliance: Tax forms for small corporations have been simplified; withholding procedures have been adopted and developed for payment of interest, procedures for income tax withholding have been simplified. Since 1991, tax payers have been required to include information on financial transactions in their income tax returns.

As we will see, one of the large changes possibly attributable to the group incentive is a concentration of agency attention on the sources most valuable for collection. This refocus of attention has also been an explicit goal of the agency. Receita Federal has directed effort towards enforcing tax compliance on the part of the 30,000 largest companies (those with monthly gross receipts of at least US$ 150,000) and has developed a special audit program to investigate compliance by 600 large companies known for tax avoidance. It has also targeted individuals not in compliance, developing programs to seize the assets of 115,000 taxpayers whose tax liability has not been entirely paid and to assess the economic profiles of 300,000 who failed to file tax returns, in an effort to search out delinquent tax payers.

This activity has two implications for our study. First, over the period in question, there has probably been a reduction in the profitability of avoidance of payment by taxpayers, due to the combined effects of lower marginal rates, lower inflation, and improved indexation. The effect is

likely to be a decrease in the set of potential evaders, and possibly an increase in the cost of an examination and decrease in the likelihood of a successful examination. Second, to the extent that we observe changes in the effectiveness of tax collection through the period, it will sometimes not be possible to determine the source of the change among the various simultaneous changes in policy.

III. EVIDENCE

The data for this study were provided by the Department0 da Receita Federal, Coordenação de Fiscalização; they cover auditing and collection activities for the years 1988 through 1991. Thus we have data for one year before the reform was adopted, for one year during which it was put into place and for two years afterward. [11]

Over this period, receipts declined in real terms; total collections by the office (delinquent or unreported taxes) fell from Cr$ 3050 million for the year 1988 to Cr$ 2530 million for the year 1991. [12] (See table 1 for details).

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[11] Data for the intermediate years is incomplete, and since we were concerned about possible temporary distortions due to the timing of the imposition of the program. Therefore we base most of our arguments on comparison between 1988 and 1991. However we report aggregate intermediate year results whenever available.

[12] All figures are calculated in January 1992 Cruzeiro; the official exchange rate at that time was Cr$ 1190 per dollar. It must be emphnoieed that gross comparisons across time are dicey: Receita Federal makes adjustments to account for within-the-year inflation according to its standard methodology, with results expressed in terms of values as of January of the following year. Across years, adjustments were made according to the IGP-DI (General Price Index-Domestic Availability). It was felt that for longer horizons this deflator provided a more realistic adjustment than the official deflator for public accounts (BTN). The conversion rates are noted in table 0 of the appendix, along with an alternative conversion based on official dollar exchange rates for the period.

The data contain three separate measures of resources devoted to collection: number of cases examined, employee hours, and "AFTN" (average number of auditors and high-level supervisors assigned). Since each measure has advantages and disadvantages, we discuss how each measure compares with measures of activity in the model outlined above.

Implicitly, the model is couched in terms of the choices made by the employee; therefore it would make sense to couch performance in terms of "collection per employee." The data provide information on the number of high-level employees only. For some activities (in particular the "external examinations" described below) this poses no problem, since the activity is carried out almost exclusively by high-level employees. For others, this seriously understates the input. The measure of employee hours has the advantage that all employees are included; moreover the measure is available at a more detailed level. Using employee hours to measure input has an important potential disadvantage, namely, the number of hours stated is endogenous to the incentive program. There are three sources of endogeneity: (1) clocked hours may contribute directly to an employee's performance rating, (2) increased incentives for collection will increase an employee's on-the-job hours and (3) since hours spent in corrupt activities may be understated, changes in levels of corruption will also change total stated hours. Similar, but more severe drawbacks apply to the third measure, the number of inspections made, since the number of inspections is clearly a criterion for agency performance under the reform. It is apparently easy in some categories of activity to make an inspection more or less intensive at will, and in such

categories the number of inspections seems to vary dramatically without significant changes in other measures of input or collection.

Variety of Activities

The department's activities are divided between "external examinations" in which an auditor goes to an individual firm or taxpayer and examines the financial and fiscal records of the entity and "internal inspections" which are based on audits of taxpayers' returns. (If questions arise on the return, these may be followed up with an "action of inquiry and impact" in which the internal examination is continued based on supporting documents and interview of the taxpayer.) In addition, the authority conducts separate inspections for customs violations.

As of 1991, measured in terms of number of examinations, activity is about equally divided among internal inspections, external examinations and customs investigations (table 2); however internal inspections are on average much briefer than the others. In 1991, for example it was estimated that the average amount of time per tax payer examined was 17 hours for an external examination and between 2 and 4 hours per internal inspection (these totals include hours of supervisory personnel). Most of employee time -- more than sixty percent -- is devoted to customs inspection.[13] However, external examinations are most dependent on the highest paid employees; therefore if the measure is taken in terms of AFTN, the bulk of activity is devoted to external examinations (table 3). The smallest portion of employee time is

[13]This claim is based on data for earlier years in the sample; comparable data for 1991 are not available.

spent on internal inspections.

External examinations yield the overwhelming portion of the funds collected -- around 90 per cent; as of 1991, the remaining collections are split evenly between internal inspections and customs investigations. Thus despite the amount of time devoted to each external examination, external examinations constitute the most lucrative part of the process, according to either input measure.

The productivity of external examinations is partly overstated by the extremly high yield from examinations in markets for financial capital, which in 1991 yielded fully one third of the total revenue obtained by the division in just 100 examinations.[14] Nonetheless, external examinations outside the financial capital markets also provide greater yield per hour spent than do internal inspections or customs activities. Part of the reason for this is the accuracy of the selection process (table 4): fully 90% of the external examinations result in collection of additional funds; internal inspections result in additional funds 30% of the time.[15] (It is unclear whether this can be attributed to the experience of the auditors in selecting institutions for external examinations, or the ubiquity of non-compliance, whether because of complexity of tax laws, or because of shortage of auditors).

Regional Variation

Collection data are subdivided by administrative region. There are ten regions; the largest region (Region 8) is the one containing São Paulo, which

[14] These yields were apparently part of a new initiative in investigations in financial markets.

[15] Note that these yields have remained the same despite the large variation in number of examinations and time devoted to them.

by 1991 constitutes half of the total collection. As of this period, the region containing Kio de Janeiro (Region 7) constitutes an additional one-sixth of the collections (table 5). Distribution of personnel among the regions is similarly skewed: one third of top-level personnel (supervisors and inspectors) works in the São Paulo region, one-fourth in the Rio region.'

The largest regions are also the most lucrative for external examinations: an examination in the Rio region yields twice the amount of revenues of an exam in other regions; an exam in the São Paulo region yields four times the revenues (table 6a). Results calculated per hour are similar (table 6b) These results are skewed, but probably not reversed, by the inclusion of examinations of financial markets.

With respect to internal inspections, there are odd geographical differences. In 1991, the São Paulo region led in value of collections from internal inspections; however the Rio region, was ninth of ten. Second place in value went to region 6 (Belo Horizonte), in which collections were five times as great as in the Rio region, despite the fact that slightly more hours were expended in examinations in the Rio region. A second anomaly in the Rio region is the extreme shortage of low-level inspectors; more than eighty percent of hours clocked in internal inspections were due to top-level inspectors in the Rio region; the average is barely over fifty percent for the country as a whole.

It is clear that the level of care which goes into an internal inspection can vary considerably from region to region and period to period. The variation over time and across region in number of tax returns inspected is much greater than the variation in the hours devoted to inspecting returns, and the variation in returns inspected is much greater than the variation in the number of returns yielding additional taxes. The highest success rate is

in the region 1 (Brasilia), where almost seventy percent of returns examined yield extra revenues in 1991, (and virtually all did in earlier years.) At the other extreme are Recife and Belo Horizonte, where less than twenty per cent of returns yielded extra revenues in 1991. In each region, a successful internal examination yields much smaller amounts of revenue on average than a successful external examination; again there is considerable geographical variation, with Recife and Belo Horizonte yielding the most lucrative amounts per successful return -- approximately sixty percent above the national average. There is also considerable variation in the amount of time taken per examination: in Rio the average is 10 hours per examination: in Brasilia the average is 12 hours per examination. The average for the country as a whole is 4 hours. Per hour spent in examinations by all examiners, the greatest returns are found in the Salvador region where returns per hour are about eighty percent above the national average; the least are in Rio where returns are about one fifth the national average.

Specific Taxes

The collection programs managed by the agency handle a large variety of taxes. The purpose of this section is to indicate which are most important in terms of collection of delinquent and unreported taxes.[16]

The vast majority of external examinations target businesses (table 7).

[16]Unfortunately, the data for collectinn of specific taxes is nnt available on a monthly basis; consequently it was not possible to apply a correction for inflation over the year. Therefore we have adjusted this data by treating yearly collections in each category as a percentage of total collections in that category and applying the price deflators to the total. The procedure will not cause too much damage as long as no particular tax recovery differs systematically over the year, but it should be realized that the figures dealing with specific taxes are therefore subject to an additional source of uncertainty in comparison with the total figures.

A majority of hours are devoted to corporate income tax; major focus is also given to withholding, the social insrance fund, and the industrial products tax. Corporate income tax and withholding together account for nearly two thirds of the collections in external examinations; the yield in 1991 from the withholding tax is distorted by the inclusion of the proceeds from the financial markets program. The industrial products tax, although less important overall, has a high payoff per hour of examiner's time. The most lucrative taxes per hour spent or per examination are the sugar and alcohol tax program and the public services program (PASEP).

More than half of the hours spent on internal inspections are focused on personal income tax audit and they yield on the order of one fourth of the total revenues from internal examinations (table 8). Corporate income tax inspections take about one-tenth of the examination hours but yield over half of the revenues.

Results

The fundamental fact to note in comparing the collections of 1988 and 1991 is that, there has been no increase in overall productivity. Total employment by the office has declined (AFTN by about 20%), real collections have decreased by about the same proportion.[17] If we omit the financial markets program, productivity has declined. Total hours worked has increased slightly for those categories for which the Jnformation is available. Thus individual employees are clocking more hours since the reform, although the return received per hour has declined.

[17]Measured in terms of IGP-DI, the decline in real receipts is about 17%; given the hyperinflation and the resultant uncertainty about real price levels, there is no significant difference between the changes in manpower and the changes in receipts.

The data set gives only one potential independent measure of any change in the difficulty of collecting taxes: the success rate. For both internal and external examinations, the success rate has remained approximately constant across the period. Thus at the aggregate level there is no evidence of any major increase in frequency of compliance as a result of the changes in the tax law, and no evidence of any increase in the cost of apprehending. (As noted below, there is evidence of improvement in success rates on a tax-by-tax basis; this however would be consistent only with a decrease in compliance, and thus a reduction in the difficulty of apprehending evaders.)

With the reduction in manpower has come some evidence of a concentration of that manpower in the more lucrative areas for examination. The reduction in employment has been proportionately smallest in the most lucrative category, external examinations. The number of external examinations has doubled, while the number of internal inspections has dropped by nearly 75%. Hours spent on external examinations have increased while those spent on internal inspections have declined dramatically. More specifically, there has been a large decline in hours spent on the least lucrative examination: internal examination of personal income tax returns, and a large increase in the most common form of external examination, corporate income tax returns.[18] There is also some evidence on a regional basis: for external examinations, those regions with the highest revenue per AFTN in 1988 suffered less cutback in manpower than average; those suffering the greatest cutback were all had lower than average revenue per AFTN (see figure 1).

[18] Indeed, given the fact that customs activities are even less lucrative than internal inspections, it might be wondered why the decline in manpower in the customs section was not even greater. Possible answers have to do with the relative difficulty of switching manpower from customs work to the other sectors and that customs work may be more important as a deterrent to evasion rather than a means of collecting revenue directly.

The implication is that on average, the agency has abandonned less lucrative cursory inspections internally, and taken on a broader spectrum of external examinations. Under these circumstances, it is not surprising that receipts per hour should drop in external examinations, since the inspectors will fill their additional time with the more difficult and time-consuming projects that were formerly left untouched. The surprise is that receipts per hour drop in internal inspections as well. Therefore we examine the behavior of productivity in internal inspections more closely.

When we divide the data by type of tax collected, we see the following changes occurred between 1988 and 1991. The success rate for each of the major types of internal inspections increased -- dramatically for corporate income tax returns, more modestly for the other two. (Table 9) In addition, while employment overall fell, there was a relative shift of high level employees towards internal investigations of corporate tax returns, and low level employees towards internal investigations of import and personal tax returns.

The manpower devoted to internal investigations of personal income taxes returns has declined so severely that the number of successful examinations in 1991 was fewer than the number in 1988, and the receipt per successful exam more than doubled. However for the other two major types of internal inspections -- imports and corporate tax returns -- the number of successful investigations has increased; thus sharp decline in revenues is due to a decline in revenue received per successful investigation. When we turn to the data on external examinations we find similar results in four of the six major categories of taxation: The number of succesful exams has increased, the percentage of successful exams has increased, but the real value of a successful exam has decreased.

There are two possible explanations which are consistent with the data. (1) Increased compliance reduced the amount that could be collected from individuals detected in evasion; meanwhile, improved selection of individual returns for investigation increased the catch of individuals among those investigated. (2) Decreased compliance (or improved targeting) increased the rate at which individuals could be apprehended, but decreased effort by the collectors reduced the amount collected from each one caught.

The data are incapable of distinguishing between a secular decline in effort by collectors and a secular decrease in evasion by taxpayers. However, cross-sectional information can still be used to detect effects of the incentive program. As noted previously, a program such as the Brazilian program, with increased marginal benefits to effort but a low ceiling, would be expected to have a greater effect on types of taxes and regions of the country initially yielding low levels of receipts. This is precisely what we observe. In all categories of tax collection, the most severe drop in revenues per hour in proportionate terms has occurred in the programs giving the greatest revenue per hour initially. The glaring exception is of course the income tax witholding, where the dramatic increase is due to the financial markets program. (See figure 2. Withholding has been omitted from the graph; if we deduct the financial markets program totals from the 1991 receipts for income tax withholding, then the remnant falls into line with the general declines.[19])

Regional variation between 1988 and 1991 shows the same pattern. It is clear that the largest regions in terms of AFTNs are also the ones which

[19]Such a deduction may be a slight overstatement, since the program could in principal have collected small delinquent or unreported amounts of other forms of taxes as well.

suffered the greatest decline in collections (even more so omitting the financial markets program which primarily affects collections in São Paulo, and to a lesser extent, Rio) It is also clear, as the subsequent graphs indicate (figures 3 and 4), that regions with low value in 1988 were the ones with most dramatic growth over the period. (This is true whether we measure in terms of low value per AFTN -- associated with high cost of effort -- or low value per examination -- associated with high levels of compliance by tax payers. Because of multicollinearity, these two possibilities cannot be distinguished.)

By all these measures, then, we have a pattern consistent with the following account: The costs to individual inspectors of catching evaders varies by region and by assignment. This causes a variation in the levels of collections made by the inspectors. The program developed in Brazil gives disproportionate incentive for increased effort to low-yield assignments, resulting in a decrease in dispersion in yields across types of taxes and across regions.

Given the available data an alternative hypothesis cannot be dismissed: that the relative increase in productivity from lower initial levels is due to "errors in variables." In other words, regions or taxes observed to have low yields in 1988 are disproportionately likely to be transiently low; the supposed growth may simply be a subsequent return to normal yields. In order to eliminate this possibility it will be necessary to collect data for earlier years and base our classification of low yield regions or taxes on a long-run average.

IV. CONCLUSION

The most natural interpretation of the data from Receita Federal is the following: Between 1988 and 1991 there has been a decline in the ease with which delinquent taxes can be collected--overall, productivity per hour by tax collectors has decreased. At the same time there has been a reduction in discrepancy in productivity across regions and types of taxes. There are two components to the convergence. First, the group incentives of the RAV (and possibly other direct mandates) have led managers in Receita Federal to concentrate manpower on those activities yielding the highest revenues, decreasing the relative marginal returns to those activities. Second, the individual incentives in the RAV are most effective in those activities which have had the lowest return per session: individuals who are involved in projects or regions which give lower returns are less likely to be constrained by the incentive ceilings which dominate the RAV program.

If individual incentives play the role described above, then there may be further confirmation in an examination of the collection activity since 1992, because the more recent adjustments to the program have effectively eliminated the individual incentives while making the group incentives even larger. The model we have described in this paper would therefore predict that attempts to allocate labor more effectively would continue unabated, but the productivity per employee would decline and the discrepancy between high and low productivity sectors would return.

APPENDIX

SUMMARY DESCRIPTION OF FEDERAL TAXES IN BRAZIL

A. Income Taxation

There are three categories of income taxation: personal income, corporate income, and withholding.

A1. Personal income taxation

Personal incomes originated with gains from capital, labor and wealth are taxed. Incomes are taxed according to the gains of each month (because of inflation); tax returns, containing the yearly income, are due in the first quarter of the next tax year.

Income assessments are based on gross incomes. Taxpayers may deduct the Employee Contribution Tax and payments made for expenses involving health and dental care. Other deductions include expenses with education, pension, and donations.

Tax brackets are as follows:

Taxable yearly income (US$)	Tax rates
up to 6,900	Exempt
From 6,900 to 14,400	15%
Over 14,400	25%

Gains from capital investments, sales of stock shares and gold are taxed at 25% tax rate. Exemptions are allowed for sales of real estate and other assets in amounts below US$ 4,000.

A2. Corporate income taxation

Corporations are taxed on their monthly-adjusted profits. Tax laws impose adjustments to the accountable profits. Tax returns are due in the first quarter of the following tax year. Gains from capital investments are treated in the same way as in the personal income tax; sales of stock shares, gold and interest payments, however, receive different treatment. As long as business expenses are considered necessary for the normal operation of the corporation, they are generally deductible. Capital can be depreciated as follows: buildings - 4%; machinery - 10%; vehicles - 20%; computer hardware and software - 20%. Tax losses can be carried forward to up to 4 calendar years. Carryback is not allowed. A company cannot claim tax losses if there was change of ownership or control.

The basic tax rate is 25% of the adjusted profit. If the monthly (annual) adjusted profit is over US$ 14,375 (US$ 172,500), a nonfinancial corporation is subject to an additional tax rate of 10%; a financial

corporation is subject to an additional tax rate of 15%.

A3. Income tax withholding

Shares of wages, salaries, commissions, fees, and interest paid by private as well as public firms are generally withheld.

B. Taxation of commodities

B1. Federal valuc addcd tax

These taxes are those imposed on industrial goods when they physically leave the production site (IPI - Tax on industrial goods) or at the time they enter the country as imports (Imports Tax).

The "ad valorem" tax rates vary according to the necessity of the product. For example, vehicles are taxed at rates ranging from 0 to 30%, depending on the fuel utilized, piston displacement, and power of the engine. Tax liability of beverages range from US$ 0.02 to US$ 6.00 per liter. Tax rates on mechanical and electrical equipment range from 5% to 15%. Some industrial products arc exempt of taxation - for example, fertilizers, fuel, food, medicines and chemicals. Exports are also exempt.

B2. Customs duties

Rates of import duties range from 0 to 50%, with an average rate of 17.1%. Some exports are subject to taxes, ranging from 1% to 10%. The duties have had a limited role in raising revenue. They have been used as instrument to control foreign trade.

C. Social Security Taxes

There are four types of social security taxes. These are: (1) the social contribution tax; (2) the social security/sales tax; (3) the social integration program tax; and (4) the employer and employee contribution tax. The social security tax is paid by corporations. Nonfinancial corporations must pay a tax equal to 10% of their adjusted profits. Financial institutions must pay a tax equal to 23% of their adjusted profits. The social security/sales tax is levied on sales of corporations, at a rate of 2%. The social integration program tax is levied on sales and interest payments received by corporations, at a rate of 0.658. Finally, the employer and employee contribution tax is a payroll tax; i.e., withholding of both employee and employer contributions. Employee monthly contribution withheld cannot exceed US$ 60.00.

D. Taxes on banking operations

These consist of taxes on financial operations and the tax on monetary transactions. Taxes on financial operations are imposed on insurance policies, short-termsecurities, exchange contracts, investment funds and on some loan. The tax rate varies from 0 to 25%. The tax on monetary transactions is temporary. It is imposed on the usage of bank checks at a rate of 0.25% of the value of the check. The tax started to be collected in September 1993 and will be collected until December 1994.

E. Property Taxes

The federal government may collect two types of property taxes: the land property tax and the wealth tax (presumably, based on the value of the property). The land property tax is levied annually, and the tax rate varies depending on land use and value.

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TABLES AND FIGURES

Table 0: Conversion Rates

	IGP-DI	BTN	Exchange Rate
Jan 92	100.000	100.000	100.000
Jan 91	16.297	17.675	16.213
Jan 90	1.482	1.834	1.701
Jan 89	0.062	1.033	0.076

Table : Total Revenues by Activity

(in billions, 1992 Cr$)

	1988	1989	1990	1991
External Examinations	2703.90	1282.29	1636.00	2360.51
Internal Inspections	275.29	243.43	140.84	93.71
Customs Activities	75.51	79.11	82.26	73.59
Total	3054.70	1604.83	1859.10	2527.81

Table A2: Number of Examinations

	1988	1989	1990	1991
External Examinations	50060	70111	n.a.	100272
Internal Inspections	403317	639091	n.a.	116582
Customs Activities	83670	114518	n.a.	122692
Total	**537047**	**823720**	**310020**	**339546**

Table 3: Mannower

Total hours (all employees, including supervisory hours)

	1988	1989	1991
External Examinations	1360516	1699539	1655710
Internal Inspections	617728	600025	447358
Customs Activities	3483211	3486148	n.a.

Average AFTN

	1988	1990	1991
External Examinations	1948.7	1718.3	1621.7
Internal Inspections	217.4	193.6	**16U.3**
Customs Activities	999.2	793.6	720.9
Total	3165.3	2707.5	2502.9

Table 4: Success Rate of Examinations

(% yielding additional revenues)

		1988	1989	1991
External	Examinations			
		92%	92%	96%
Internal	Inspections			
		29%	31%	30%

Table 5: Revenues by Region

(in billions of 1992 $Cr)

Region	Major City	1988	1989	1990	1991
1	Brasilia	107.44	74.34	153.27	72.71
2	Belem	76.20	81.69	48.98	53.25
3	Fortaleza	40.01	17.71	50.94	68.38
4	Recife	**70.50**	44.15	**106.37**	**71**.71
5	Salvador	51.99	49.56	88.99	83.58
6	B.H.	138.11	68.26	139.89	166.48
7	Rio de Ja.	783.34	501.88	433.72	447.13
8	Sao Paul0	1563.44	598.63	652.00	1342.61
9	**Curitiba**	94.67	**88.40**	75.69	**106.82**
10	P. Alegre	129.01	80.20	109.26	115.14
Total		3054.70	1604.83	1859.10	2527.81

Table 6a: Revenues per examination. by region

(in millions of 1992 $Cr)

External Examination

Region	Major City	1988	1989	1991
1	Brasilia	22.02	9.87	12.21
2	Belem	11.43	9.34	6.86
3	Fortaleza	14.22	6.78	14.76
4	Recife	20.25	10.19	13.15
5	Salvador	24.31	23.21	16.49
6	B.H.	22.51	7.52	15.38
7	Rio de Ja.	81.60	28.47	20.67
8	Sao Paula	92.45	20.95	41.70
9	Curitiba	28.29	17.05	12.22
10	P. Alegre	36.63	17.20	15.05
National Average		54.01	18.29	23.54

Internal Inspection

Region	Major City	1988	1989	1991
1	Brasilia	0.47	2.05	2.37
2	Belem	4.41	0.57	1.24
3	Fortaleza	2.52	0.57	0.65
4	Recife	0.08	0.07	0.82
5	Salvador	0.04	0.06	1.09
6	B.H.	1.28	0.08	0.79
7	Rio de Ja.	0.34	1.68	0.50
8	Sao Paul0	2.07	0.67	1.07
9	Curitiba	0.51	0.57	0.76
10	P. Alegre	0.65	0.56	0.41
National Average		0.68	0.38	0.80

Customs Activities

Region	Major City	1988	1989	1991
1	Brasilia	2.53	2.63	1.47
2	Belem	3.78	5.75	0.82
3	Fortaleza	0.13	0.60	0.62
4	Recife	0.19	0.19	0.19
5	Salvador	1.71	1.37	0.54
6	B.H.	2.15	0.44	0.32
7	Rio de Ja.	0.51	0.39	0.24
8	Sao Paul0	0.65	0.40	0.59
9	Curitiba	0.60	0.70	0.61
10	P. Alegre	1.52	1.61	1.29
National Average		0.90	0.69	0.60

Table 6b: Revenues per AFTN. by region

(in millions of 1992 $Cr)

External Examination

Region	Major City	1988	1990	1991
1	Brasilia	1014.52	2025.34	1058.04
2	Belem	349.96	486.45	564.87
3	Fortaleza	393.22	621.28	899.14
4	Recife	624.13	914.21	724.21
5	Salvador	739.36	1293.98	1518.33
6	B.H.	612.29	902.37	1243.41
7	Rio de Ja.	1553.10	861.66	1040.01
8	Sao Paul0	2278.64	1060.16	2326.31
9	Curitiba	701.32	600.57	834.93
10	P. Alegre	1023.30	921.70	1194.24
National	Average	1387.54	952.10	1455.58

Internal Examination

Region	Major City	1988	1990	1991
1	Brasilia	580.54	1647.62	642.21
2	Belem	1974.71	937.42	590.90
3	Fortaleza	668.69	343.25	290.30
4	Recife	574.65	2393.94	960.92
5	Salvador	714.16	1912.15	1302.43
6	B.H.	1052.56	1025.41	2017.09
7	Rio de Ja.	632.41	409.35	419.35
8	Sao Paul0	1987.29	402.54	361.79
9	Curitiba	413.24	320.99	460.75
10	P. Alegre	573.21	754.93	586.15
National	Average	1266.29	720.05	584.62

Customs Activities

Region	Major City	1988	1990	1991
1	Brasilia	107.91	90.60	227.55
2	Belem	265.41	70.32	70.69
3	Fortaleza	0.18	20.03	35.36
4	Kecife	3.15	6.29	11.36
5	Salvador	77.73	54.96	23.26
6	B.H.	267.59	53.10	131.84
7	Rio de Ja.	33.63	72.84	33.68
8	Sao Paul0	97.28	123.33	147.71
9	Curitiba	23.42	89.65	136.61
10	P. Alegre	28.48	229.60	167.73
National	Average	75.57	103.66	102.08

Table 6c: Revenues per hour, by region

(in millions of 1992 $Cr)

External Examination

Region	Major City	1988	1989	1991
1	Brasilia	1126.04	461.67	679.26
2	Belem	531.80	564.35	474.33
3	Fortaleza	571.97	246.16	1032.44
4	**Recife**	**837.17**	**434.45**	742.03
5	Salvador	1130.26	752.73	1424.70
6	B.H.	988.32	452.45	888.79
7	Rio de Ja.	2282.48	1072.46	1417.08
8	Sao Paul0	3247.04	855.51	2287.99
9	Curitiba	1096.52	555.28	711.72
10	P. Alegre	1207.87	495.21	849.92
National Average		1987.41	754.49	1425.68

Internal Examination

Region	Major City	1988	1989	1991
1	Brasilia	152.75	1089.63	190.65
7	Belem	**603.87**	320.92	136.15
3	Fortaleza	647.31	720.58	267.76
4	Recife	180.68	200.00	291.94
5	Salvador	256.89	311.68	357.75
6	B.H.	340.44	175.73	295.32
7	Rio de Ja.	115.09	815.96	50.95
8	Sao Paul0	903.86	386.27	205.41
9	**Curitiba**	**144.37**	203.29	**207.31**
10	P. Alegre	203.95	207.25	244.94
National Average		445.65	405.70	209.48

Table 7: External Examinations by Tax

Tax	hours	exams	revenues total (billions)	%	(in 1992 Cr$) per hour (millions)	per exam (millions)
1988						
Corporate Income Tax	808128	15735	1359	50%	1.68	86.36
Industrial Products Tax	125295	3537	439	16%	3.51	124.25
Personal Income Tax	73083	3456	58	2%	0.79	16.64
Social Integration Program	114499	10867	70	3%	0.61	6.43
Income Tax Withheld	92750	6884	272	10%	2.94	39.56
Social Investment Fund	43436	4148	23	1%	0.54	5.63
Others	103325	5433	483	18%		
Total	1360516	50060	2704	100%		
1991						
Corporate Income Tax	937001	24725	614	26%	0.65	24.82
Industrial Products Tax	143390	3392	119	5%	0.83	35.00
Personal Income Tax	120716	11908	56	2%	0.47	4.72
Social Integration Program	106789	15404	49	2%	0.46	3.21
Income Tax Withheld	83977	10982	1112	47%	13.24	101.24
Social Investment Fund	70043	10764	86	4%	1.23	8.04
Others	193794	23097	324	14%		
Total	1655710	100272	2361	100%		

Table 8: Internal Inspections by Tax

Tax	hours	exams	revenues total (billions)	%	(in 1992 Cr$) per hour (millions)	per exam (millions)
1988						
Pers. Income Tax Returns	437621	260921	91	33%	0.21	0.35
Import Declarations	72009	31089	17	6%	0.24	0.56
Corp. Income Tax Returns	79931	108868	156	57%	1.96	1.44
Other	28167	2439	11	4%		
Total	617728	403317	275	100%		
1991						
Pers. Income Tax Returns	292624	33642	26	28%	0.09	0.77
Import Declarations	75178	43159	11	12%	0.15	0.26
Corp. Income Tax Returns	49284	35898	53	57%	1.08	1.48
Other	30272	3883	3	4%		
Total	447358	116582	94	100%		

Table 9: Success Rates by Tax

	Success Rate		Revenue (millions Cr$) per Successful Exam	
	1988	1991	1988	1991
External Examinations				
Corporate Income Tax	82%	90%	104.96	27.60
Industrial Products Tax	84%	87%	147.08	40.36
Personal Income Tax	95%	98%	17.57	4.81
Social Integration Program	99%	99%	6.47	3.24
Income Tax Withheld	97%	96%	40.59	105.97
Social Investment Fund	96%	99%	5.84	8.15
Internal Inspections				
Pers. Income Tax Returns	40%	44%	0.87	1.74
Import Declarations	7%	10%	7.59	2.72
Corp. Income Tax Returns	7%	42%	19.97	3.55

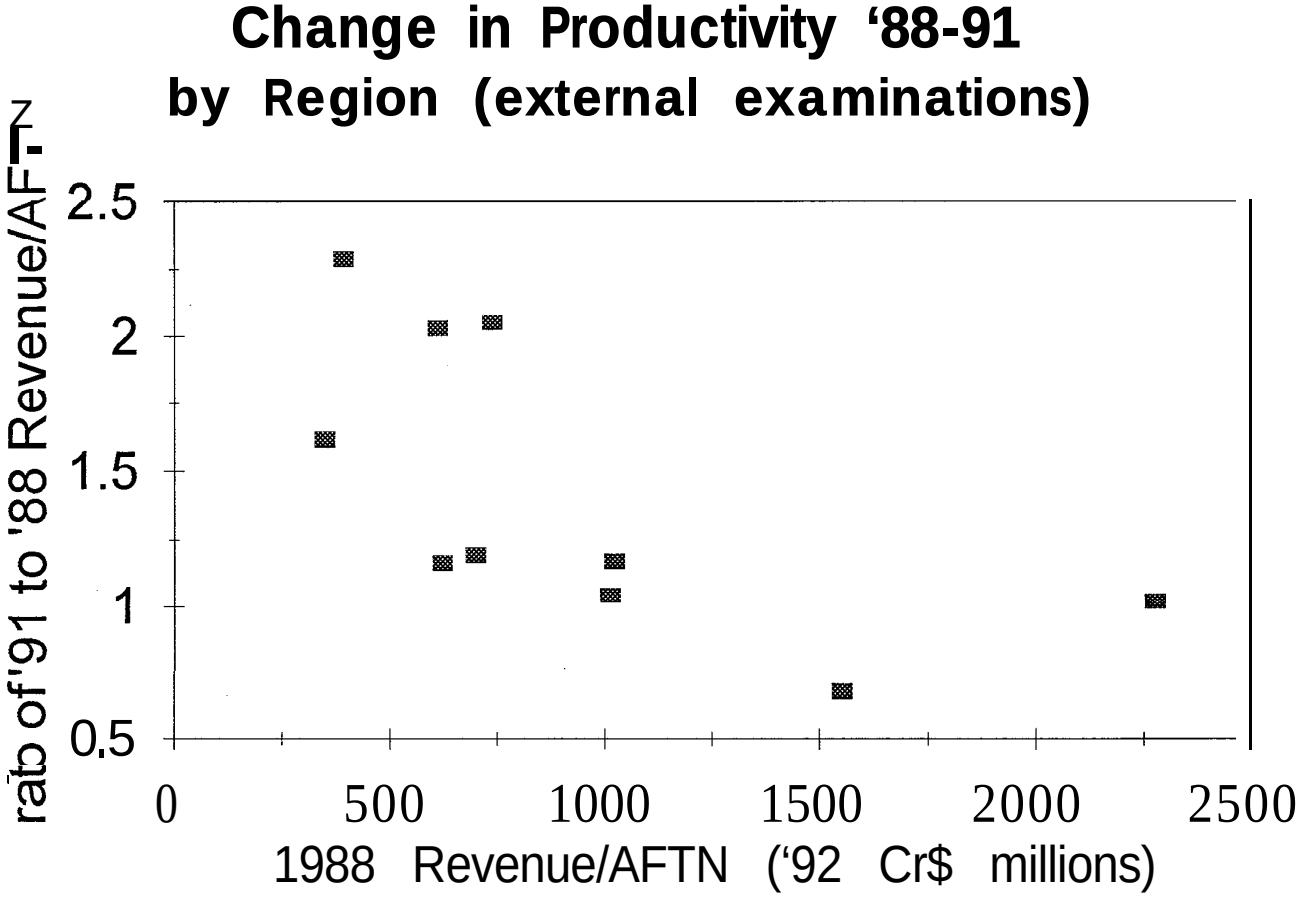

Change in Productivity '88-91
by Region (external examinations)
ratio of '91 to '88 Revenue/AFTN
2.5
2
1.5
1
0.5
0
500
1000
1500
2000
2500
1988 Revenue/AFTN ('92 Cr$ millions)

Figure 3

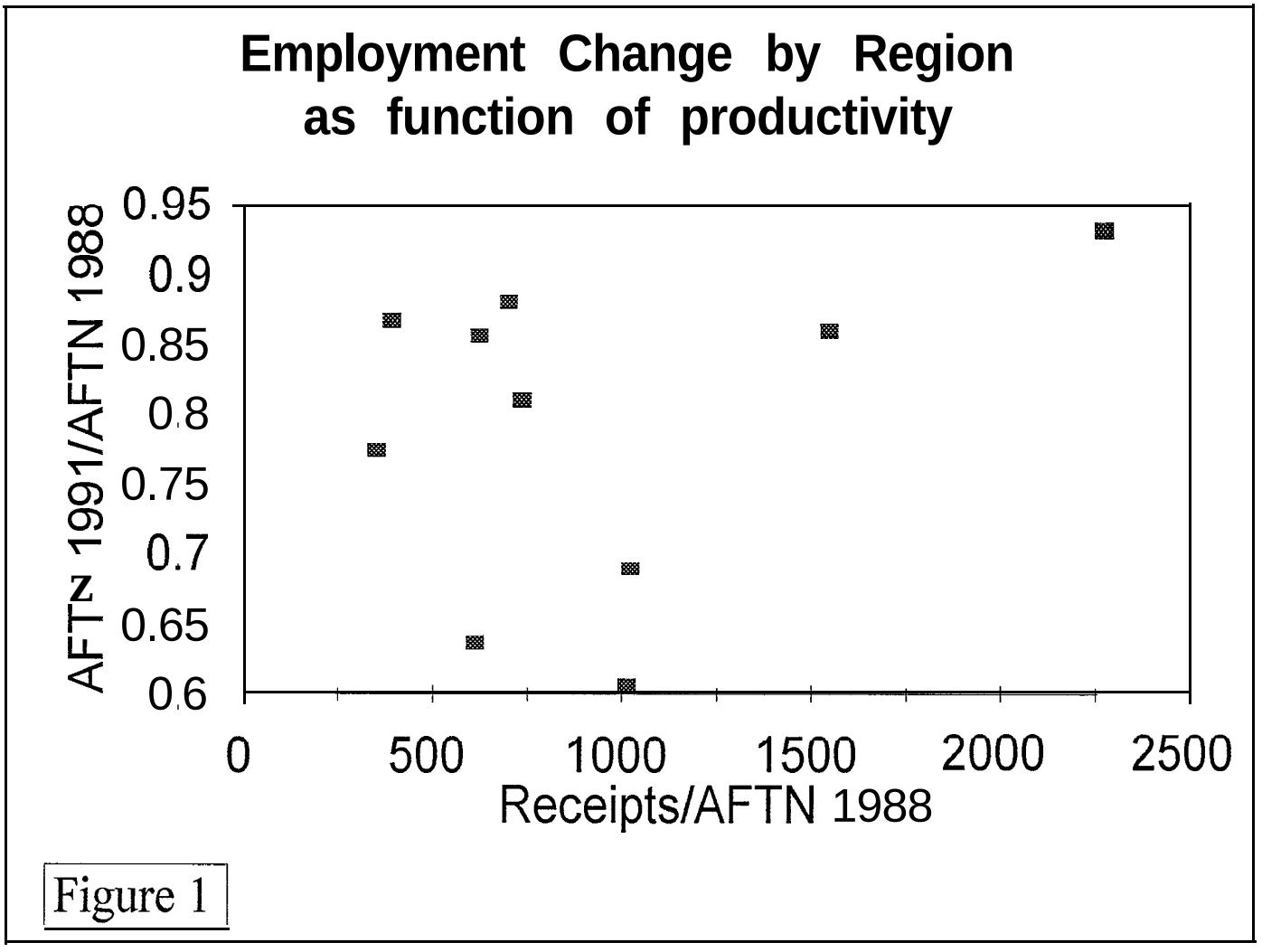
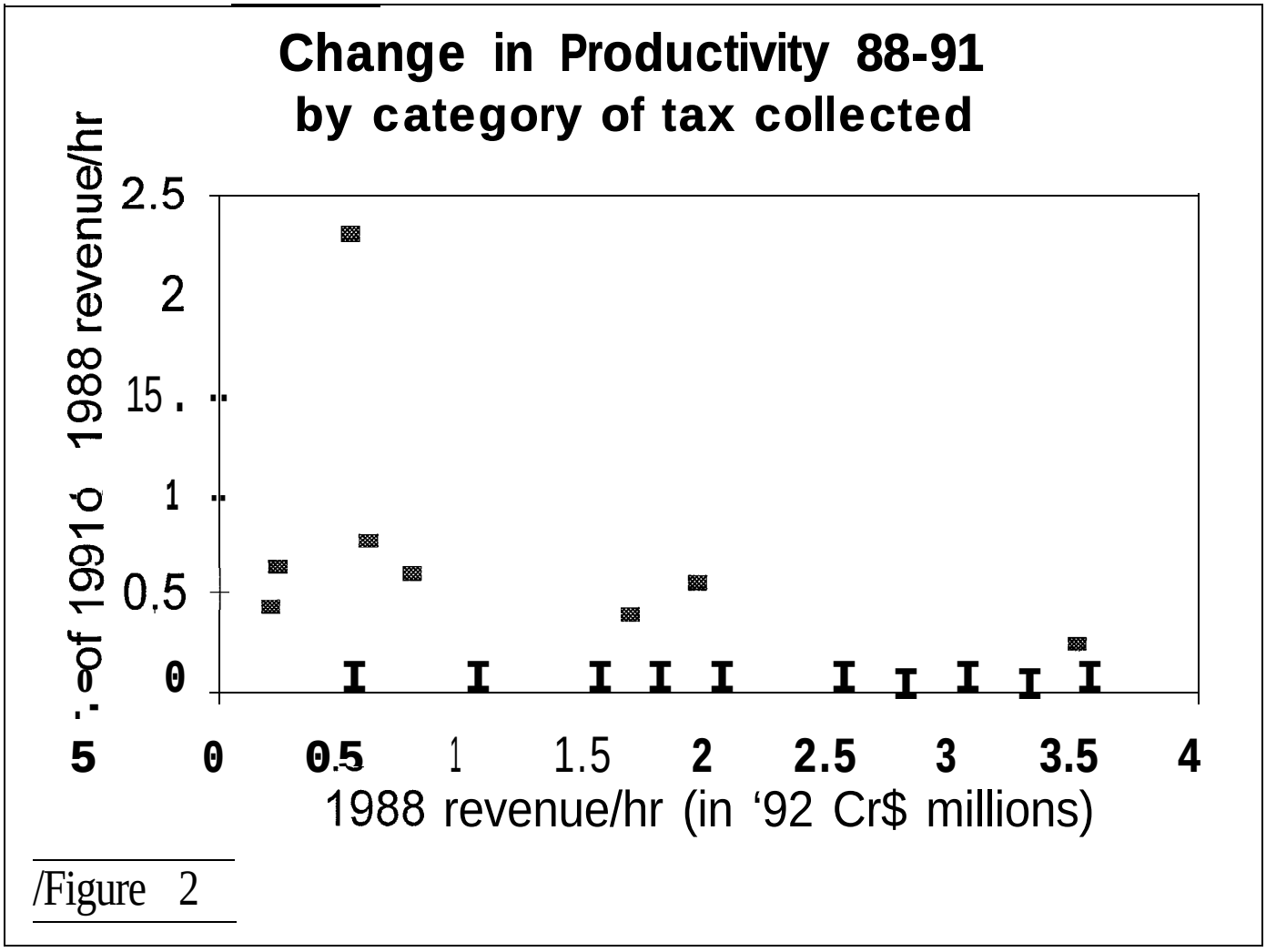

Employment Change by Region
as function of productivity
AFTN 1991/AFTN 1988
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
0
500
1000
1500
2000
2500
Receipts/AFTN 1988

Figure 1


Change in Productivity 88-91
by category of tax collected
1991 revenue/hr of 1988 revenue/hr
2.5
2
1.5
1
0.5
0
0
0.5
1
1.5
2
2.5
3
3.5
4
1988 revenue/hr (in '92 Cr$ millions)

/Figure 2